were observed in each case, especially in declination. The Survey, it seems, has decided that, beginning with 1913, all the results of magnetic observations will be referred to the "International Standard of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington." This entails a reduction of one-tenth per cent. in the values of horizontal force previously published. An interesting question of the near future promises to be what this "international standard" really means, and how it is to be maintained constant.

IN view of the recent report to the Board of Agriculture on the possibility of reviving the flax industry in Great Britain, a paper on the field and industrial retting of the fibre read before the Société d'Encouragement de l'Industrie Nationale (*Bulletin,* vol. cxxi., p. 153) by M. Albert Durand, the general secretary of the Comité Linier of France, has especial interest. An account is given in this paper of the different methods of retting of flax now used in France, as well as of the new mechanical and biochemical processes which have been the subject of trials on the large scale. It is interesting to note that M. Durand considers the policy of inaugurating central retting establishments, which was proposed in the report to the Development Commission, as one that could be adopted with advantage in France. The account given of the recent processes of Feuillette and Peufaillet for retting flax, illustrated as it is by numerous photographs, is a special feature of the paper.

Science Progress for January contains a vigorous editorial article on militarism and party politics, a criticism by Dr. H. G. Plimmer of Mr. T. A Cook's recent work on the "Curves of Life," and a survey of the problem of vitalism by Mr. Hugh Elliot. Mr. Rhys Jenkins contributes an interesting article on the international struggle for manufactures as illustrated by the history of the alum trade, Mr. Allan Ferguson gives a summary of recent work on capillary constants and their measurement, and Dr. J. N. Pring reviews the question of the formation of ozone in the upper atmosphere and its influence on the optical properties of the sky. Dr. Edridge-Green deals with colour vision and colour vision theories, a subject which at the present time "is in a state of chaos," and Mr. C. E. Wallis gives an interesting comparison of ancient and modern dentistry.

Engineering for January 15 contains an article on the balancing of high-speed machinery by Messrs. H. D. Wheeler and R. V. Southwell. After giving a clear account of the nature of the problem, the authors describe their optical arrangement in use at Messrs. Lawrence Scott and Company's works for the accurate balancing of high-speed armatures. The armature is supported in ball bearings which can move in a horizontal direction at right angles to the shaft against the action of springs which normally keep the bearings central. The armature is driven by a narrow strap which runs vertically on to and off the armature. At a certain speed depending on the size of the armature and the strength of the springs, the two bearings begin to oscillate in the same direction, showing that one side is heavier than the other. At a higher speed generally about double the former, the bearings again oscillate but now in opposite directions, showing a want of dynamic balance. By means of a circular disc with an involute slot in it, fixed on one end of the shaft, light from the vertical filament of a lamp placed under the bearing is focussed on a screen after reflection at a small mirror which rocks about a vertical axis as the bearings move. By means of the curve traced by the spot of light the proper positions of the balance weights can be found more quickly and more accurately than by the "chalk mark" method.

OUR ASTRONOMICAL COLUMN.

THE RED REGION IN THE SPECTRA OF WOLF-RAYET STARS.—In the *Comptes rendus* for January 25 (vol. clx., p. 124) a note is presented by M. J. Bosler on an investigation which he has carried out at the Meudon Observatory on the study of the red region of the spectra of Wolf-Rayet stars. The advance in the magnitude and efficiency of astronomical equipment renders a more minute study of the spectra of faint stars possible, and the bathing of photographic plates opens up new regions of the spectrum for close inspection. M. Bosler describes here the result of the work on fifteen Wolf-Rayet stars, seventy-five clichés in all having been obtained with exposures varying from two to three and a half hours. In the communication he gives a short table, reproduced below, showing the wave-lengths and intensities of several of the lines in the spectra of these stars, which he considers are of more special interest. In the brief discussion he refers to the spectra of novæ and their points of semblance with these bright-line stars, and is led to the view that the Wolf-Rayet stars are only the enfeebled remains of novæ which have appeared in the course of past centuries. The following table embodies the data in five of the stars mentioned above, the figures in brackets indicating the intensities of the lines:—

B.D. 3821+39° Mag. 7·1 (7 plates): 711 (3) 691 (2) 6675 (2) 6563 (5Hα) 643 (2) 6395 (2) 624 (1).
B.D. 4001 +35° Mag. 8·5 (6 plates): 711 (2) 691 (2) 677 (2) 6678 (3) 6563 (5Hα) 643 (1) 6395 (1).
B.D. 4013+35° Mag. 8·0 (8 plates): 6718 (3) 664 (?) 657 (5Hα) 6425 (2) 6300 (1) 624 (?).
B.D. 3639+30° Mag. 9·5 (8 plates): 6717 (2) 6570 (20Hα) 630 (?).
B.D. 3571+43° Mag. 7·5 (1 plate): 6715 (1) 6563 (5Hα) 642 (2).

AID TO ASTRONOMICAL RESEARCH.—In a communication to *Science* (vol. xli., No. 1046, January 15, 1915) Prof. E. C. Pickering directs attention to the great success of research funds, and points out the large returns which can be obtained from relatively small grants to suitable persons. Believing that the greatest return in astronomical output can be obtained by moderate grants to leading astronomers, he has addressed a letter to twelve American astronomers asking them to make a statement showing how they would apply a grant supposing it consisted of one thousand dollars a year for five years. In the communication in question Prof. Pickering publishes the replies he has received, and all without exception would welcome such a grant. An unexpected result of the request was that in nearly every case the principal need proved to be for assistants. The question now arises whether the money can be obtained, but if all cannot be secured, Prof. Pickering suggests that astronomers with fewer assistants should receive precedence. In some cases it is hoped that those interested in a particular observatory may be willing to supply its needs.

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THE SPECTRUM OF LIGHTNING.—It is not very often that a very successful photograph of the spectrum of lightning is obtained, but that secured by Mr. A. Steadworthy, and reproduced in the Journal of the Royal Astronomical Society of Canada (September–October, 1914) is of this nature. The easiest way to secure such photographs is by placing a prism or a transparent replica grating in front of the camera lens. In the case of the former the spectrum only is photographed, but in that of the latter images of both the flash and the spectrum are recorded side by side. Mr. Steadworthy employed the first method, using a 60° dense flint glass prism in front of a 2-in. lens of 16-in. focus. The account is accompanied by the measurements of the lines of the spectrum made by Mr. J. B. Cannon, of the Ottawa Dominion Observatory. The wave-lengths of fifty lines are given, and a comparison table is given containing the wave-lengths of the lines measured in the fine spectrum obtained and described by Mr. Fox in the *Astrophysical Journal* (vol. xviii., p. 295). Mr. Steadworthy also secured ten excellent stereoscopic photographs of lightning flashes, some of which are reproduced in his article.

REPORT OF THE SMITHSONIAN ASTROPHYSICAL OBSERVATORY.—The director of the Astrophysical Observatory of the Smithsonian Institution, Prof. C. G. Abbot, has issued his report for the year ending June, 1914. This report contains a brief statement of the equipment of the observatory, the work of the observatory at Washington, and at Mount Wilson. It is shown that progress has been made in the measurement of the effects produced by atmospheric water vapour on solar and terrestrial radiation. New apparatus for measuring sky radiation has been devised and perfected. A most interesting account is given, including an illustration, of special pyrheliometers for recording solar radiation at great altitudes when attached to free balloons. The highest elevation at which a radiation record has been obtained was about 14,000 metres, or nearly 45,000 ft. The results obtained tend to confirm the adopted value of the solar constant of radiation. A Tower telescope has been erected and put into operation on Mount Wilson. The tower is 50 ft. high and equipped temporarily with a reflecting telescope of 12-in. aperture and 75 ft. focal length. By means of it the variability of the sun has been independently confirmed, and it is stated that changes of the distribution of radiation over the sun's disc occur in correlation with the changes of the sun's total radiation.

ORNITHOLOGICAL NOTES.

IN the report of the council of the Royal Society for the Protection of Birds, embodied in the winter number of *Bird Notes and News,* it is stated that four British lighthouses have now been fitted with bird-perches. The same issue also contains the results of the 1914 competitions for school challenge shields in connection with "bird-and-tree day." Despite a good series of essays from Woburn, the Bedfordshire shield has been withdrawn, on account of the lack of competitors; Lancashire, on the other hand, bids fair to receive the award of a shield during the current year.

In an article on the probable effect of the war in the western area on birds, in *La Nature* for January 16, Dr. E. L. Trouessart expresses the opinion that storks in Alsace and local ground-birds and partial migrants throughout the area of conflict will be the main sufferers. Night-flying migrants, on the other hand, will probably steer clear of the chief areas of conflict, which, looking at the subject in a wide sense, are relatively small. In the neighbourhood of Arras the country was reported to be the resort of myriads of crows in December, attracted doubtless by the rich supply of food.

Among the more notable birds observed in Hertfordshire in 1913, Mr. W. Bickerton records, in the Transactions of the Hertfordshire Natural History Society for January, quail, snipe, and goldcrests as breeding in the county, together with casual visits of the oriole, hobby, and dotterel.

In anticipation of a fuller notice in a forthcoming issue of his *Birds of Australia,* Mr. G. M. Mathews revises the classification of the frigate-birds in vol. ii., No. 6, of the *Austral Avian Record.* Hitherto only two species of these birds have been recognised, *Fregata aquila* and *F. ariel,* the former a widely spread type, split up by some ornithologists into three or four local forms. Mr. Mathews, on the other hand, restricts *F. aquila* to the Ascension Island bird, both sexes of which are wholly black, with no rust-colour on the white heads of the young. The other frigate-birds hitherto classed with *F. aquila* are for the most part identified with *F. minor,* of Gmelin, the typical locality of which is taken to be Jamaica, several subspecies, from the Seychelles, Aldabra, Laysan, the Galapagos, etc., being recognised. The frigate-bird of Christmas Island, Indian Ocean, is described as a new species, with the name of *F. andrewsi,* and is characterised by the under-parts being wholly white in the female and partially so in the male. Lastly, we have *F. ariel,* typically from Torres Strait, characterised by the presence of a white patch on the flanks of the cock, and of which three local races are recognised.

Hybridism in cockatoos forms the subject of an article (illustrated by a coloured plate) by Dr. E. Warren in vol. iii., pt. 1, of the Annals of the Natal Museum, dated September, 1914. A male of the sulphur-crested *Cacatua galerita,* and a female of the slender-beaked *Licmetis nasica,* have been kept for the last eight years or so in a state of semi-confinement in the open air at Pietermaritzburg. During the latter portion of that period the female laid several eggs, two of which were duly hatched. The two hybrids, which are practically similar to one another, are to a great extent intermediate in coloration and plumage between their parents, although nearer to the sulphur-crest than to the slender-beaked species, the resemblance to the former being especially shown by the stoutness and blackness of the beak, as well as by the red loreal patch of the female parent being replaced by orange, and by the total disappearance of the red at the bases of the feathers behind the eyes, so characteristic of the latter. Whether this resemblance of the hybrids to their male parent is due to prepotency in the latter, and the bearing of the whole case on Mendelism, form the subject of a long discussion by the author.

In reference to a recent discussion with regard to birds travelling northwards in autumn on the British coasts, Mr. J. H. Gurney records in the *Zoologist* for December, 1914, that an immense series of flocks of various species were seen flying northwards on October 7 over Cromer, Northreps, and Overstrand, the wind at the time being north. Mr. Gurney is of opinion that such movements are annual, and that after a short interval the wanderers would return south.

During a trip to eastern Siberia in the summer of 1914 Miss Maud Haviland was fortunate enough to come across the curlew-sandpiper breeding at Golchica, at the mouth of the Yenisei. Eggs of this species, it may be recalled, were collected by Mr. H. L. Popham, in July, 1897, on the Kristovski Islands, which are a considerable distance further down the estuary.

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